R E P O R T R E S U M E S

ED 014 965 JC 670 392

AN AVIATION COURSE FOR JUNIOR COLLEGES.
CESSNA AIRCRAFT CO., WICHITA, KANS.

PUB DATE 66

EDRS PRICE MF-$0.25 HC-$1.96 47P.

DESCRIPTORS- *JUNIOR COLLEGES, *AVIATION TECHNOLOGY, TECHNICAL EDUCATION, *COURSE DESCRIPTIONS, CURRICULUM GUIDES, LESSON PLANS, INSTRUCTIONAL MATERIALS,

THE COURSE IS IN TWO PARTS. IN PART 1, A PROGRAM OF 60 HOURS COVERS SUCH TOPICS AS FLIGHT PRINCIPLES, AIRCRAFT OPERATION AND PERFORMANCE, NAVIGATION, THE FLIGHT COMPUTER, RADIO GUIDANCE AND COMMUNICATION, WEATHER, FLIGHT INFORMATION PUBLICATIONS, FEDERAL AVIATION REGULATIONS, THE AIRWAY SYSTEM, FLIGHT INSTRUMENTS, AND FLIGHT PLANNING. THE TOPICS OF PART 2 ARE HISTORY OF AVIATION, AVIATION TODAY, AVIATION AND THE INDIVIDUAL, AND THE GOVERNMENT IN AVIATION. THE SYLLABUS INCLUDES BRIEF LESSON PLANS, A REFERENCE BIBLIOGRAPHY, SUGGESTIONS TO TEACHERS, AND SOURCES OF INSTRUCTIONAL FILMS. (WO)

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AN AVIATION COURSE FOR JUNIOR COLLEGES

UNIVERSITY OF CALIF.
LOS ANGELES
JUN 1 1967
CLEARINGHOUSE FOR
JUNIOR COLLEGE
INFORMATION

JC 670 592

AN AVIATION COURSE FOR JUNIOR COLLEGES

Air Age Education Division

CESSNA AIRCRAFT COMPANY

INTRODUCTION

The COURSE GUIDE FOR JUNIOR COLLEGE AVIATION is based on the belief that every student in this nation's junior colleges should be given the opportunity to become literate in the dominant transportation of our nation and world; he should be given minimum factual knowledge which will help him gain insight into the implications of aviation on the social, political, economic, and technical facets of society; he should have the opportunity to survey the many vocational and career possibilities for himself in this growing industry; he should become aware of aviation's potential to serve him as a user of transportation in his work and recreation; and he should recognize his civic responsibilities in supporting and promoting the aviation industry at community, state, and national levels.

This course guide includes topics for study which go beyond the usual ground school type aviation course: such topics as history and background of flight, airports, manufacturing of aircraft, economic importance of aviation, government as it relates to aviation, and global aviation. The ground school portions are presented in such a way that those students wishing to do so may take the Federal Aviation Agency's written test for private pilots. Whether the Federal Aviation Agency's test is taken or not, the student will have a sound understanding of the mechanics of flight and the general aviation industry.

We recommend that teachers of this course should have some aviation background, preferably a private pilots license. In lieu of this, we believe an adequate job can be done by teachers of social studies who have taken an aerospace education workshop (offered by over 175 colleges and universities each summer), and have also taken a ground school course to familiarize themselves with the aeronautics portions of the content.

Finally, schools will find, much support from the Cessna distributors and dealers in their local areas.

CONTENTS

The Aviation Course for Junior Colleges is logically divided into parts: (1) general information about aviation, and (2) aeronautical knowledge of the airplane and flight itself. We recommend the two-part division because the entire subject of aviation is such an encompassing one that organization in some manner is almost necessary to preserve some continuity.

That part of the course dealing with aeronautical knowledge is planned to take 60 hours of the 90 hour semester; the general information portion will take the remaining 30 hours. The teacher may offer the two parts in whatever order he chooses; our recommendation is that the aeronautical part be taught first. Recommended time elements are given for the 60 hour part.

For those students wishing to take the FAA Private Pilot written exam at the conclusion of the 60 hour portion of the course, the teacher should contact the General Aviation District Office through any local FAA office. Arrangements can be made for group testing.

The general information part is not broken down in time elements, allowing the teacher to exercise his preference in presenting his own emphasis and scope to the topics listed.

ORDER OF PRESENTATION		HOURS
PART ONE		
I.	Principles of Flight	5 hours
II.	Aircraft and Engine Operation	4 hours
III.	Aircraft Performance	4 hours
IV.	Navigation and Chart Reading	10 hours
V.	Flight Computer	4 hours
VI.	Radio Guidance in VFR Flying	3 hours
VII.	Radio Communications	1 hour
VIII.	Flight Information Publications - Airports	2 hours
IX.	Weather	10 hours
X.	Federal Aviation Regulations	10 hours
XI.	Structure of Airway System	1 hour
XII.	Flight Instruments	3 hours
XIII.	Attitude Instrument Flying	2 hours
XIV.	Flight Planning	1 hour
		60 hours

PART TWO

I. Historical Background of Aviation

II. Aviation Today - Local, National, and Worldwide

- A. Airports
- B. Manufacturing
- C. Economic importance
- D. Global aviation

III. Aviation and the Individual

IV. Government in Aviation

REFERENCE BIBLIOGRAPHY FOR GROUND COURSES

PUBLICATION	COST	SOURCE
*AERONAUTICAL CHARTS AND RELATED PUBLICATIONS	Free	(8)
AIRMAN'S INFORMATION MANUAL		
PART 1	$ 2.00	(1)
PART 2	$ 2.00	(1)
PART 3	$ 9.00	(1)
*AVIATION PUBLICATIONS; CIVIL AVIATION, NAVAL AVIATION, AIR FORCE. Price List 79	Free	(1)
AVIATION WEATHER 1965	$ 2.25	(1)
AOPA FOUNDATION "THE AOPA 360° RATING"	$10.00 per 100 copies	(2)
CHARTS		
* APPROACH AND LANDING	$ .10	(3)
ENROUTE HIGH ALTITUDE CHART	$ .25	(3)
ENROUTE LOW ALTITUDE CHART	$ .25	(3)
LOCAL	$ .25	(3)
SECTIONAL	$ .30	(3)
* VFR/IFR PLANNING CHART	$ 2.00	(3)
WORLD AIR CHART	$ .25	(3)
*COMMERCIAL PILOT EXAMINATION GUIDE, 1966	$ .75	(1)
DAILY WEATHER MAP (SUNDAY PREFERRED)	$ .03	(1)
*ESSA	Free	(8)
EXAM-O-GRAMS IFR PILOT	Free	(4)
EXAM-O-GRAMS VFR PILOT	Free	(4)
CESSNA 150 OWNER'S MANUAL	Free	(5)
E-6B COMPUTER	$10.00 average	(6)

PUBLICATION	COST	SOURCE
*FAA AVIATION NEWS	$ 1.50 annually	(1)
*FAA WHAT IT IS AND WHAT IT DOES	Free	(7)
FEDERAL AVIATION REGULATIONS		
PART 1 May 15, 1962	$ .25	(1)
PART 43 July 6, 1964	$ .20	(1)
PART 45 April 20, 1964	$ .20	(1)
PART 61 November 1, 1962	$ .50	(1)
PART 71 December 12, 1962	$ .20	(1)
PART 91 September 30, 1963	$ .50	(1)
PART 141 September 17, 1962	$ .25	(1)
FLIGHT PLAN FORMS FAA FORM 398 (6-62)	Free	(7)
*FLIGHT TEST GUIDE - PRIVATE PILOT, AIRPLANE, SINGLE ENGINE 1966	$ .20	(1)
FLIGHT TRAINING GUIDE, PRIVATE PILOT (Airplane) 1964	$ 1.00	(1)
FLIGHT TRAINING HANDBOOK 1965 AC61-21	$ .70	(1)
*GROUND INSTRUCTOR EXAMINATION GUIDE BASIC-ADVANCED 1963 (Being Revised)	$ .45	(1)
*GROUND INSTRUCTOR EXAMINATION GUIDE INSTRUMENT 1965	$ .50	(1)
*HURRICANE INFORMATION	Free	(8)
KEY TO AVIATION WEATHER FORECASTS 1966	$ .05	(1)
PERSONAL AIRCRAFT INSPECTION HANDBOOK 1964	$ .50	(1)
PLANE SENSE AC20-5 1963	Free	(7)
PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE 1965 Published 1966	$ 2.75	(1)

PUBLICATION	COST	SOURCE
REFRESHER COURSES - PRIVATE and COMMERCIAL PILOTS 1964 AC-10	$ .15	(1)
*STANDARD AIRCRAFT TAXI SIGNALS 1959	$ .10	(1)
*STATUS OF THE FEDERAL AVIATION REGULATIONS	Free	(7)
STUDENT PILOT GUIDE AC-61-12A October 1965	$ .15	(1)
*TORNADO WATCH L.S. 6514 December 1965	Free	(8)
*UNITED STATES AIR FORCE DICTIONARY 1956	$ 4.00	(1)
WAKE TURBULENCE AC-90-23A	Free	(7)
*WEATHER IN SPACE 1963	$ .10	(1)
*ARE YOU "WEATHER WISE"?	Free	(7)

*Publications not included in the curriculum but desirable for the Aviation Library.

SOURCES FOR

REFERENCE BIBLIOGRAPHY FOR GROUND COURSES

(1) Superintendent of Documents
Government Printing Office
Washington, D.C. 20402

(2) AOPA Foundation, Inc.
4650 East-West Highway
Bethesda, Maryland 20014

(3) Director - Coast and Geodetic Survey
Washington Science Center
Rockville, Maryland 20852

(4) FAA Aeronautical Center
Flight Standards Technical Division AC-700
Operations Branch AC-740
P.O. Box 25082
Oklahoma City, Oklahoma 73125

(5) Cessna Aircraft
Air Age Education
P. O. Box 1521
Wichita, Kansas 67201

(6) Flight School or Aviation Publications Sales

(7) Federal Aviation Agency
Printing Branch HQ-438
Washington, D. C. 20553

(8) Department of Commerce
Environmental Science Services Administration
Rockville, Maryland 20852

SUGGESTIONS TO TEACHER

1. Exam-O-Grams needed for the students 1 through 37

   Exam-O-Grams included in PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE: 1, 3, 7, 8, 9, 10, 11, 12 & 13.

   Additional Exam-O-Grams needed: 2, 4, 5, 6, 14 through 37.

   Exam-O-Grams (Instrument) needed for the Instructor: 5, 7, 10, 14, 15 and 16.

2. Availability of classroom and standard size E6B Computers are available from numerous commercial sources.

3. Mail orders from the Superintendent of Documents are filled within a month to a month and a half on the average.

   Telephone orders are promptly filled. Call Order Clerk Superintendent of Documents Office, Washington, D. C.

4. The Sunday (any Sunday) Weather Map has the explanation of the symbols and other information on the back. It should be ordered at least three weeks in advance. The smallest quantity that can be ordered from Superintendent of Documents is 50 maps or a quarterly subscription can be obtained for $2.40.

5. "The AOPA 360^{O}" Rating" manual can be obtained from

AOPA Foundation, Inc. Teachers should write directly to AOPA Foundation. Individual copies can be obtained for 10 cents each.

6. The Denault Computers - Fixed Pitch and Variable Pitch - (a computer used to determine aircraft performance on air fields of high elevation and high density altitude) are 50 cents and are available from

FEDERAL AVIATION AGENCY
OFFICE OF HQ OPERATIONS
PRINTING BRANCH HQ 438
WASHINGTON, D. C. 20553

However, the KOCH chart which is found on page 99 of the PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE and on the back of most sectional maps is a suitable substitute.

7. AIRMAN'S INFORMATION MANUAL Parts 2, 3 and 3A should be available to the students. One copy would probably be sufficient. It would be very desirable for each student to have a copy of Part 1.

8. Charts that are to be used for display purposes are often given to the displaying agency by the Coast and Geodetic Survey. The VFR/IFR PLANNING CHART is a desirable chart for display. Obsolete charts are free, if available.

Universities, junior colleges, and high schools can purchase charts at a 50% discount, from Coast and Geodetic Survey.

9. From the High School and Junior College Survey dated May 11, 1966, and updated August 31, 1966, Cessna Aircraft Company, it was determined that the most successful programs were those that contained a flight experience.

The flight experiences are generally conducted by the local aircraft dealer. It is suggested that the course instructor contact the local dealer concerning his willingness to cooperate in the program and establish a schedule so that students can contact the dealer at their own option at the proper time in the course.

Two optional flight experiences are recommended. One short flight around the local area at the beginning of the course and another flight of approximately 1 1/2 hours duration which is flown in a four-place aircraft with three students by a FAA Certified Flight Instructor. Each student prepares a flight plan for the entire trip but actually flies only one 30 minute leg of this three legged flight from the left hand seat.

This flight is recommended to take place after the navigation section of the ground course. At this stage of the program, the student should have enough aeronautical knowledge to plan and navigate the trip. The fees for these voluntary flight

experiences are generally paid by the student.

The aircraft dealer receives the full amount of this fee in order to pay for the operating expenses for the aircraft and the insurance covering both the aircraft and the passengers.

10. For teachers who are teaching the aviation course for the first time, the 60 hour ground school portion can be naturally grouped for review or course planning into the following sections:

CHAPTERS	I, II & III
CHAPTERS	IV & V
CHAPTERS	VI, VII & VIII
CHAPTER	IX
CHAPTER	X
CHAPTERS	XI, XII, XIII & XIV

The Commercial Pilot Examination Guide is also suggested as a good reference for review questions.

16 MM FILM SOURCES

1. Air Force Film Library Center
   8900 S. Broadway
   St. Louis 25, Missouri

   Two weeks notice required.
   Return postage paid by the agency making the request.
   Publication listing films available may be received.

2. Navy Films for Public and Television Showings
   Department of the Navy
   Office of Information
   Washington, D.C. 20425

   13 Naval Districts are sources for film.
   No charge for film. Borrowing agency pays return postage.
   Publication listing films available may be received.

3. Association Films, Inc.
   347 Madison Ave.
   New York 17, New York

   Free except for postage. Catalog available on request.

4. United World
   Free Film Service
   2301 Classen Boulevard
   Oklahoma City, Oklahoma

   Free except for Postage. Catalog available on request.

5. Audio Visual Director
   Sterling Movies, U.S.A.
   Central Booking Exchange
   100 West Monroe St.
   Chicago 3, Illinois

   Free except for postage. Catalog available on request.

6. Southwestern Bell Telephone Company
   Southwest Bell Film Library
   c/o Southwest Soundfilm
   1709 S. Lamar
   Dallas 15, Texas

   Free except for postage. Catalog available on request.

7. **Federal Aviation Agency**
Film Library AC-142-1
Aeronautical Center
P.O. Box 1082
Oklahoma City, Oklahoma

Free

8. **Texas Christian University Film Library**
T. C. U. Campus
Fort Worth, Texas

$1.00 per film plus postage both ways. Some 35 mm films available. Catalog available upon request.

9. **Walt Disney Productions**
Educational Film Division

1. **500 S. Buena Vista Ave.**
Burbank, California
2. **237 W. Northwest Highway**
Park Ridge, Illinois
3. **477 Madison Avenue**
New York 22, New York

Films available on a Lease Fee Basis.

I - PRINCIPLES OF FLIGHT

MATERIAL NEEDED: PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE: AIRMAN'S INFORMATION MANUAL, PART 1; Exam-O-Grams 3, 17, 26, 27, 28; FLIGHT TRAINING HANDBOOK.

REFERENCE MATERIAL FOR THE INSTRUCTOR: PERSONAL AIRCRAFT INSPECTION HANDBOOK; FLIGHT TRAINING HANDBOOK, Pages 7-13, 15-19, 23-24, 30-39, 53-61, 115-117, 139-143.

LESSONS: Pages 1-14 PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE; Exam-O-Gram 3 and AIRMAN'S INFORMATION MANUAL Pages 37-39; Exam-O-Gram 17, 26, 27, 28; FLIGHT TRAINING HANDBOOK Page 25.

II - AIRCRAFT AND ENGINE OPERATION

MATERIAL NEEDED: PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE: Exam-O-Gram 10.

REFERENCE MATERIAL FOR THE INSTRUCTOR: PERSONAL AIRCRAFT INSPECTION HANDBOOK; FLIGHT TRAINING HANDBOOK, Pages 24-27, 116.

LESSON: Pages 78-87 PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE; Exam-O-Gram 10.

III - AIRCRAFT PERFORMANCE

MATERIAL NEEDED: PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE; Exam-O-Grams 11, 13, 33, 37; Excerpt from Cessna OWNER'S MANUAL on Weight and Balance, 3-4, 3-5, 3-6; FLIGHT TRAINING HANDBOOK; Fixed Pitch and Variable Pitch Computer - Denault Computer, if available, or the KOCH chart on page 99 of PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE.

REFERENCE MATERIAL FOR THE INSTRUCTOR: PERSONAL AIRCRAFT INSPECTION HANDBOOK; FLIGHT TRAINING HANDBOOK, Pages 1-5, 7-8.

LESSONS: PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE Weight and Balance, Pages 97-98, Exam-O-Gram 13, Excerpt from Cessna OWNER'S MANUAL 3-4, 3-5, 3-6; Loads and Load Factor, Pages 11 and 14, Exam-O-Gram 28; FLIGHT TRAINING HANDBOOK, Pages 1-5; Aircraft Performance, Pages 98-104 of PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE, Exam-O-Grams 11, 33, 37; Use of Fixed Pitch and Variable Pitch Computers, or the KOCH chart.

Use the following five pages on WEIGHT AND BALANCE before using the Excerpts from the Cessna OWNER'S MANUAL.

WEIGHT AND BALANCE

Weight and balance limits are placed on airplanes for two principal reasons: First, the effect of the weight on the primary and secondary structures; and second, the effect of the location of this weight on flight characteristics, particularly in stall and spin recovery, and on stability. Gross weight is also a factor in take-off and landing performances.

The recovery from a stall in any airplane becomes progressively more difficult as its center of gravity is moved aft. An airplane loaded excessively nose heavy will be difficult to taxi, particularly in high winds; can be nosed over easily by use of the brakes; and will be difficult to land without bouncing, since it tends to pitch in on the wheels as it is slowed down to flare out for landing.

In loading an airplane the structure affected must be considered. Seats, baggage compartments, and even cabin floors are designed for a certain load, or concentration of load, and no more.

Current weight and balance data is required to be carried in each certificated airplane, from which a pilot may compute its actual or permissible loading. This data is usually carried in conjunction with the Airplane Flight Manual, if one is available for the airplane concerned. Normally this information may be found in the OWNER'S MANUAL which every manufacturer places in the airplane.

The center of gravity of an object is, in simple language, the point at which it balances. Ranges of weights and centers of gravity within which the airplane may be safely operated must be established. The manufacturer of an airplane who builds his airplane to meet the AIRWORTHINESS STANDARDS for NORMAL, UTILITY, AND ACROBATIC CATEGORY is governed by Part 23 of the Federal Aviation Regulations. The requirements for AIRWORTHINESS STANDARDS: TRANSPORT CATEGORY AIRPLANES are covered in Part 25 of the Federal Aviation Regulations.

TERMINOLOGY: The following terminology is used in tne practical application of weight and balance control:

MAXIMUM WEIGHT: The maximum weight is the maximum authorized weight of the aircraft and its contents as listed in the specifications.

EMPTY WEIGHT: The empty weight of an airplane includes all operating equipment that has a fixed location and is usually installed in the aircraft. The fuel and the oil that cannot be drained from the systems are included in the empty weight.

DATUM: The datum is an imaginary vertical plane from which all horizontal measurements are taken for balance purposes with the aircraft in level flight attitude.

ARM (or moment arm): The arm is the horizontal distance in inches from the datum to the center of gravity of an item.

MOMENT: Moment is the product of a weight multiplied by its arm.

WEIGHT AND BALANCE (Continued)

To solve problems involving weight and balance we shall use the following formula to determine the CENTER OF GRAVITY:

$$\frac{\text{TOTAL MOMENTS}}{\text{TOTAL WEIGHT}} = \text{CENTER OF GRAVITY (C. G.)}$$

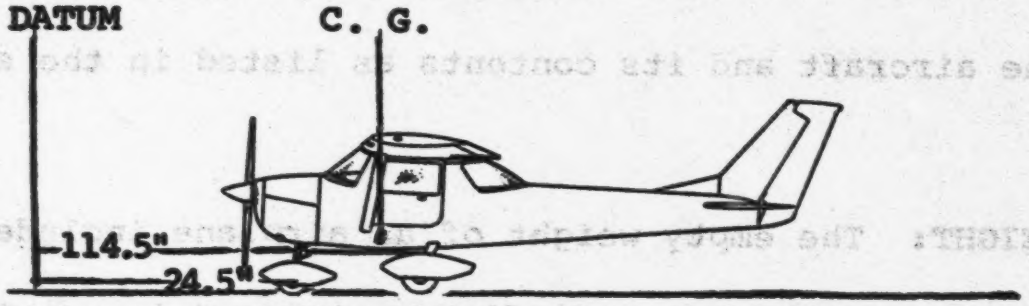
(TOTAL MOMENTS DIVIDED BY THE TOTAL WEIGHT IS EQUAL TO THE CENTER OF GRAVITY)

EXAMPLE OF THE FORMULA:

Weight of the Left Wheel	826 pounds
Weight of the Right Wheel	831 pounds
Weight of the Nose Wheel	637 pounds
Datum Line to the Nose Wheel	24.5 inches
Datum Line to the center line of the Main Gear	114.5 inches

(HYPOTHETICAL EXAMPLE)

1. Empty Weight C.G. Location



637# x 24.5" = 15,606.5 inch pounds
831# x 114.5" = 95,149.5 inch pounds
826# x 114.5" = 94,577.0 inch pounds
2,294# 205,333.0 inch pounds

$$\frac{205,333.0}{2,294} = 89.5\text{"} \quad \text{C. G. Location}$$

2. Allowable C. G. travel with respect to the Datum Line for Normal and Maximum Weight:

For 2640 pounds	89.7 - 100 inches
For 3500 pounds	94.0 - 100 inches

WEIGHT AND BALANCE (Continued)

SOLVE THE FOLLOWING PROBLEMS:

Use 6 pounds per gallon as the weight of gasoline
Use 7.5 pounds per gallon as the weight of oil

	ITEM	WEIGHT	ARM	MOMENT
1.	Empty Weight	2,294#	89.5"	_____
	Oil (4 gallons)	_____	59.0"	_____
	Fuel (25 gallons)	_____	113.0"	_____
	Pilot	170#	89.0"	_____
	C. G. Location	_____	(90.5" answer)	
2.	Empty Weight	2,294#	89.5"	_____
	Oil (4 gallons)	_____	59.0"	_____
	Fuel (72 gallons)	_____	113.0"	_____
	Pilot	170#	89.0"	_____
	Passenger	170#	89.0"	_____
	C. G. Location	_____	(92.4" answer)	
3.	Empty Weight	2,294#	89.5"	_____
	Oil (4 gallons)	_____	59.0"	_____
	Fuel (72 gallons in main tank)	_____	113.0"	_____
	Fuel (10.6 gallons in auxiliary tank)	_____	113.0"	_____
	Pilot and Passenger in front	340#	89.0"	_____
	Passengers in two rear seats	340#	126.5"	_____
	Baggage	0#	150.0"	0 inch pounds
	C. G. Location	_____	(96.1" answer)	

WEIGHT AND BALANCE (Continued)

In most civilian airplanes it is not possible to fill all seats, cargo space, and fuel tanks, and still remain within approved weight and balance limits. In some four-place and six-place airplanes, the fuel tanks may not be filled to capacity when a full complement of passengers and their baggage are to be carried.

IV - NAVIGATION AND CHART READING

MATERIAL NEEDED: PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE: Exam-O-Grams 12, 18, 23, 24, 25, 27; plotter or protractor and a ruler; scratch paper; Local, Sectional, WAC Charts.

REFERENCE MATERIAL FOR THE INSTRUCTOR: FLIGHT TRAINING HANDBOOK, Pages 86-90.

LESSON: PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE, Pages 59-78; Exam-O-Grams 12, 18, 23, 24, 25, 27.

Emphasize the association in the WIND TRIANGLE that GROUND SPEED is measured on the TRUE COURSE and that TRUE AIRSPEED is measured on the TRUE HEADING. Use Local, Sectional and WAC Charts for symbols and chart reading.

V - FLIGHT COMPUTER

MATERIAL NEEDED: PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE; E6B Computer; Dallas Sectional Chart; Plotter or Protractor and a Ruler.

REFERENCE MATERIAL FOR THE INSTRUCTOR: See below.

LESSONS: PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE, Pages 129-144. After working the material in the text-books, use the Dallas Sectional Chart; Pilot's Planning Sheet, Page 75; and the Winds Aloft Forecasts, Page 55 (disregard the stations such as MKC) to work a few fictitious problems.

VI - RADIO GUIDANCE IN VFR FLYING

MATERIAL NEEDED: PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE; Exam-O-Grams 15, 16, 19, 26; Dallas Sectional.

REFERENCE MATERIAL FOR THE INSTRUCTOR: FLIGHT TRAINING HANDBOOK, Pages 90-98; Instrument Pilot Exam-O-Grams 7, 14.

LESSON: PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE, Pages 106, 148-157; Exam-O-Grams 15, 16, 19, 26. Use the Dallas Sectional Chart to set up fictitious problems using VOR.

VII - RADIO COMMUNICATIONS

MATERIAL NEEDED: PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE; AIRMAN'S INFORMATION MANUAL, PART 1; Exam-O-Grams 14, 35.

REFERENCE MATERIAL FOR THE INSTRUCTOR: AIRMAN'S INFORMATION MANUAL, Parts 2 and 3.

LESSON: PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE, Pages 144-148; AIRMAN'S INFORMATION MANUAL, Part 1, Pages 21-23, 53; Frequency Utilization Plan in AIRMAN'S INFORMATION MANUAL, Page 12. Use the Dallas Sectional Chart and choose a few airports to determine frequency utilization. Check Parts 2 and 3 of AIRMAN's INFORMATION MANUAL for frequencies. If there is a discrepancy, check the publication dates. The information from the most recent publication should be the information used. Exam-O-Grams 14, 35.

VIII - FLIGHT INFORMATION PUBLICATIONS - AIRPORTS

MATERIAL NEEDED: PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE; AIRMAN'S INFORMATION MANUAL, PART 1; Dallas Sectional.

REFERENCE MATERIAL FOR THE INSTRUCTOR: AIRMAN'S INFORMATION MANUAL, Parts 2, 3 and 3A.

LESSONS: Check information in textbook, page 105, against first page in AIRMAN'S INFORMATION MANUAL for correct section divisions; pages 105-128. Cross Check:

AIRMAN'S INFORMATION MANUAL	PRIVATE PILOT'S HANDBOOK
Part 1 - 7-8, 12	106
Part 1 - 5-6, 11-12	107
Part 1 - 39, 37	109
Part 1 - 53-54	110
Part 1 - 66, 72	111
Part 1 - 78	112
Part 1 - 1-4	114
Part 3 - v-vi	115
Part 3 - v-vi, 8	116
Part 1 - 67	117
Part 3 - 103	118
Part 3 - 132	119
Part 3A (All)	120

VIII - FLIGHT INFORMATION PUBLICATIONS (Continued)

AIRMAN'S INFORMATION MANUAL	PRIVATE PILOT'S HANDBOOK
Part 2 - iii and Part 3 - vii	121
Part 2 - iv and Part 3 - vii-viii	122
Part 2 - iv and Part 3 - viii-ix	123
Part 2 - 171-188	124-126
Part 3 - 36-40	127

Depart Abilene Municipal for Fort Worth-Greater Southwest International and determine the radio frequencies to be used for communication on take-off, navigation enroute, and communication on arrival for transmitting and receiving. If you desired weather information from the Fort Worth Radio, what are the possible frequencies you might transmit and receive on? Make other imaginary flights, some to airports without a tower. Check for services and fuel available.

Check the AIRMAN'S INFORMATION MANUAL, Part 3, for DATES OF LATEST EDITIONS OF charts.

IX - WEATHER

MATERIAL NEEDED: PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE; AIRMAN'S INFORMATION MANUAL, PART 1, Pages 31-41; Exam-O-Grams 5, 9, 20, 21, 26, 32, 34, 36, 37; Daily Weather Map (any Sunday because of the explanation on the back); WAKE TURBULENCE.

REFERENCE MATERIAL FOR THE INSTRUCTOR: AVIATION WEATHER 1965 INSTRUMENT: Exam-O-Grams 5, 10, 15 and 16; KEY TO AVIATION WEATHER FORECASTS.

LESSONS: PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE, Pages 15-59; Exam-O-Grams 5, 9, 20, 21, 26, 32, 34, 36, 37. Use the Weather Map before going into Forecasts on Page 50; AIRMAN'S INFORMATION MANUAL, Pages 31-41. When studying sequence reports (Pages 56-57 in the PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE) refer to the AIRMAN'S INFORMATION MANUAL pages 25-30 concerning the NOTAM CODE. (Part 1)

X - FEDERAL AVIATION REGULATIONS

MATERIAL NEEDED: PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE; Federal Aviation Regulations, Parts 1, 43 45, 61, 71, 91; AIRMAN'S INFORMATION MANUAL, Part 1; Exam-O-Grams No. 1, 2, 4, 6, 7, 22, 26, 29, 30, 31, 36, 37; Dallas Sectional Map from the PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE; STUDENT PILOT GUIDE AC61-12A; PLANE SENSE.

REFERENCE MATERIAL FOR THE INSTRUCTOR: FAR Part 141; PRIVATE PILOT AIRPLANE FLIGHT TRAINING GUIDE; FLIGHT TRAINING HANDBOOK, Page 98.

LESSONS: Cover the following in the classroom.

FAR Part 1:

Administrator, Aircraft, Airplane, Airport, Airport traffic area, Air traffic, Air traffic clearance, Air traffic control, Category, Ceiling, Class, Commercial operator, Controlled Airspace (Refer to FAR 71.7, 71.9, 71.11 & 71.13 and PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE, Page 114), Critical altitude, Critical attitude, Flight level, Flight plan, Flight time, Flight visibility, IFR conditions, IFR over-the-top, Instrument, Large aircraft, Load factor, Medical Certificate, Night operate, Over-the-top, Pilotage, Pilot in Command, Positive control,

X - FEDERAL AVIATION REGULATIONS (Continued)

Reporting point, Restricted area, Second in command, Small aircraft, Standard atmosphere, Time in service - Type, VFR over-the-top, ATC, CAS, IAS, ICAO, IFR, MSL, TAS, V_F, V_{FE}, V_H, V_{LE}, V_{LO}, V_{NE}, V_S, VFR, VOR, and VORTAC. Part 1 is a reference section to be used as the definitions are used in other sections.

FAR Part 43:

43.3, 43.9, 43.11, PLANE SENSE Pages 4-5.

FAR Part 45:

45.11, 45.21, 45.23, PLANE SENSE Pages 11-13, 45.25, 45.33

FAR Part 61:

61.3; 61.5; 61.7; 61.9 a and e; 61.13; 61.15 a, b and f; 61.16 a, b and c; 61.17 h; 61.19; 61.20; 61.21; 61.23; 61.25; 61.26; 61.27 a and b; 61.29; 61.35 a, 61.39; 61.43; 61.47; 61.51; 61.61; 61.63 a; 61.65; 61.73; STUDENT PILOT GUIDE AC61-12A Pages 4-11; 61.81; 61.83; 61.85; 61.87; 61.101 STUDENT PILOT GUIDE AC61-12A Pages 11-22.

FAR Part 71:

71.3 (Use Dallas Sectional Chart); 71.5 a, b(1), and c(1), d; 71.7 (Use Dallas Sectional); 71.9; 71.11 (Use Dallas Sectional); 71.19.

FAR Part 91:

91.3; 91.5 and Exam-O-Gram number 6; 91.7; 91.9;

X - FEDERAL AVIATION REGULATIONS (Continued)

91.13; 91.15; 91.17; 91.21; 91.27 and PLANE SENSE Pages 6-14; 91.29; 91.31; 91.33 a, b and c; 91.39; 91.63 and PLANE SENSE Page 17; 91.65; 91.67 and Exam-O-Grams 22 and 29; 91.71; 91.73; 91.75; 91.77; 91.79 and Exam-O-Gram 1, 91.81; 91.83 a and b, also Exam-O-Gram 6; 91.85; 91.87 a, b, c, e, f and h; 91.89; 91.93; 91.95 (Use Dallas Sectional Chart); 91.105 and Exam-O-Grams 1 and 7; 91.107 and Exam-O-Gram 37; 91.109 and Exam-O-Gram 2; 91.163; 91.165; 91.167; 91.173 and PLANE SENSE Pages 18-19; 91.175.

AIRMAN'S INFORMATION MANUAL Part 1:

Pages 5, 7, 8, Frequency Utilization Plan page 12, Page 15 Radar-General, 17, 18 down to AIRWAY BEACONS, 30, 41, 42, 43, 49 Exam-O-Grams 30 and 31, 50 down to FLIGHT PLAN - IFR, 53, 54, 55 (SPECIAL VFR FLIGHT CLEARANCE PROCEDURES), 56 (5 a, b and c), 65 (RADAR ASSISTANCE TO VFR AIRCRAFT), 71, 72, 73, 74 down to APPROACH CONTROL, 78, PRIVATE PILOT'S HAND-BOOK OF AERONAUTICAL KNOWLEDGE Page 112, 89, 90, 91 down to COAST GUARD RESCUE COORDINATION CENTERS.

XI - STRUCTURE OF AIRWAY SYSTEM

MATERIAL NEEDED: AIRMAN'S INFORMATION PART 1; Dallas Sectional Chart; FEDERAL AVIATION REGULATIONS PART 71.

REFERENCE MATERIAL FOR THE INSTRUCTOR: Enroute Low Altitude and Enroute High Altitude Charts.

LESSONS: Use the AIRMAN'S INFORMATION MANUAL Pages 57, 71 with the Dallas Sectional Chart to better understand the Victor Airways. Explain that L/MF (LOW and MEDIUM FREQUENCY RANGES) colored airways are decreasing in number because of the replacement of the L/MF facilities with Radio Beacons and VOR. Review FAR Part 71.5 for the extent of the Federal Airways. Explain that the airways are utilized by all pilots, but that pilots flying under instrument flight rules follow the airways.

XII - FLIGHT INSTRUMENTS

MATERIAL NEEDED: PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE; the AOPA 360° Rating; Exam-O-Grams 8, 12.

REFERENCE MATERIAL FOR THE INSTRUCTOR: See below.

LESSONS: PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE Pages 87-95; Exam-O-Grams 8, 12; the AOPA 360° Rating Pages M2-M7.

XIII - ATTITUDE INSTRUMENT FLYING

MATERIAL NEEDED: The AOPA 360° Rating

REFERENCE MATERIAL FOR THE INSTRUCTOR: FLIGHT TRAINING HANDBOOK Pages 74-81.

LESSONS: The AOPA 360° Rating Pages M7-M12. Analyze each figure on Pages M10-11. Start again with the first figure and increase power. What effect will it have on the instruments? Decrease power will have what effect? Change one at a time: aileron, rudder, elevator and analyze the effect on the instruments.

XIV - FLIGHT PLANNING

MATERIALS NEEDED: PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE; FLIGHT PLAN BLANKS; Dallas Sectional Chart, REFRESHER COURSES FOR PRIVATE AND COMMERCIAL PILOTS.

REFERENCE MATERIAL FOR THE INSTRUCTOR: See below.

LESSONS: PRIVATE PILOT'S HANDBOOK OF AERONAUTICAL KNOWLEDGE Pages 157-160. Instructor gives the students the information needed to fill out a Flight Plan for a flight from Abilene, Texas, to Dallas, Texas, on the Dallas Sectional Chart. Each student fills in the information on the Flight Plan both front and back. REFRESHER COURSES FOR PRIVATE AND COMMERCIAL PILOTS Pages 4-8.

PART II

I. Historical Background of Aviation

A. Ancient references to man's desire to fly: Archytas' Flying Pigeon, Wan Hu and his rocket chair, Myths and Legends.

B. Balloons

C. Gliders and Kites to 1903

D. Technological advances of aviation

1. 1903 - 1920

2. 1920 - 1945

3. 1945 to present

Sources: 1. <u>History of Flight</u>, American Heritage Series
American Heritage Publishing Company
551 5th Avenue
New York, New York 10017

2. <u>Flight</u>, Life Science Library
Time-Life Books
Time and Life Building
Rockefeller Center
New York, New York 10020

3. Encyclopedia and other general references

4. National Aerospace Education Council
616 Shoreham Building
806 15th Street N.W.
Washington, D.C. 20005
<u>Aviation Education Bibliography</u> - Information on history of aviation

5. National Air Museum
Smithsonian Institution
Washington, D.C. 20560
<u>Historical Aircraft and Flyers</u>

Films: 1. "Man in Flight", color 31 minutes
Walt Disney 16mm Films
350 S. Buena Vista Street
Burbank, California

2. "We Saw It Happen", B/W 58 or 88 minutes Free loan.
United Aircraft
Public Relations Department
East Hartford, Connecticut 06108

Other films listed in the above listed
Aviation Education Bibliography

Memberships: 1. American Aviation Historical Society, a non-profit corporation dedicated to the preservation and dissemination of the recorded history of aviation. Annual dues to the Soceity include the quarterly Journal.
$6.00 per year.
P. O. Box 45-435
Los Angeles, California 90045

2. Cross & Cockade, Journal of the Society of World War 1 Aero Historians, a non-profit organization whose purpose is to gather and publish factual information about any aspect of the 1914 - 1918 War in the Air. Subscriptions $6.00 per year. Checks payable to Cross & Cockade.
George H. Cooke
10443 South Memphis Avenue
Whittier, California 90604

II. General Aviation Today - Local, National and Worldwide

A. Airport

1. Functions and facilities

2. Management

3. Financing and planning - Present and future needs

4. Goods and services processed through the local airport

5. Transportation of people - who flies and why (By survey of airplane population at the local airport(s) and their uses)

B. Manufacturers of airframes, power-plants, and other components

1. Types of general aviation planes on the market

2. Costs and operational requirements of each category

C. Economic importance of general aviation

1. Employment

2. Material

3. Size and composition of general aviation fleet
Hours and miles flown; purposes, or type of flying

D. Global Aviation

1. Maps and mapmaking

2. Civil Aviation, worldwide

3. International Civil Aviation Organization

4. International Air Transport Association

Sources: 1. Federal Aviation Agency, Library Service Division
800 Independence Avenue, S.W.
Washington, D.C. 20553
Bibliographies available on these subjects:
Airports and Heliports: Design, Construction and Maintenance.
Free. List #9 July 1963
Airport Management. Free. List #3 March, 1962

2. Superintendent of Documents
Government Printing Office
Washington, D.C. 20402
FAA Statistical Handbook - Summary of official statistical data on Civil Aviation in the U.S.

3. Air Transportation Association of America
1000 Connecticut Avenue, N.W.
Washington, D.C. 20036
Facts and Figures. Free

4. National Aerospace Education Council
616 Shoreham Building
806 15th Street, N.W.
Washington, D.C. 20005
U.S. Aircraft, Spacecraft, Missiles, latest edition $2.00

5. Airport Operators Council
1700 K Street, N.W.
Washington, D.C. 20006
Airports of the Future

6. Federal Aviation Agency
Aeronautical Reference Branch
Attn: MS-158
Washington, D.C. 20025
Publications of the FAA. Free. Listing of 78 titles for purchase from Government Printing Office.
The FAA. Free
Dulles International Airport. Free.

7. International Air Transport Association
1060 University Street
Montreal 3, Quebec, Canada
Facts About IATA. Free
The Airport and the Community. Free
The IATA Clearinghouse. Free
Economics of Air Transport. $.35

8. International Civil Aviation Organization
International Aviation Building
Montreal, Quebec, Canada
ICAO: What It Is, What It Does, How It Works. Free.

9. National Business Aviation Association
Suite 401, Pennsylvania Building
425 13th Street, N.W.
Washington, D.C. 20004
Bulletins on business aviation

10. Utility Airplane Council
1725 DeSales Street, N.W.
Washington, D.C. 20036
List of manufacturers

Periodicals:

1. "Air Facts" (Monthly)
   Air Facts, Inc.
   70 Nassau Street
   Princeton, New Jersey 08540

2. "Aviation Week and Space Technology"
   McGraw-Hill, Incorporated
   330 W. 42nd Street
   New York, New York 10036

3. "Flying" (Monthly)
   Ziff-Davis Publishing Company
   One Park Avenue
   New York, New York 10016

4. "Private Pilot Magazine" (Monthly)
   Gallant Publishing Company
   550 S. Citrus
   Covina, California 91722

* 5. "The AOPA Pilot" (Monthly)
   4650 East-West Highway
   Bethesda, Maryland 20014

Films:

1. Cessna Aircraft Company
   P. O. Box 1521
   Wichita, Kansas 67201
   "World On Wings" Color. 28 Minutes Production of Aircraft
   "Wings for Doubting Thomas" Color. 14 minutes Salesman learns to fly

2. National Air Taxi Conference
   1346 Connecticut Avenue, N.W.
   Washington, D.C. 20036
   "Air Taxi, U.S.A." Color. 24 minutes. Link between small towns and scheduled airlines.

*The normal rate for this magazine is $10.00 per year. Teachers may obtain this magazine for $4.00 per year if they direct a letter to the attention of Mr. Arthur H. Frisch on official school letterhead stationery signed by a school official and accompanied by an official school check.

3. Lockheed-Georgia Company
Motion Picture Film Library
Zone 30, B-2 Building
Marietta, Georgia 30060
"You Call the Shot" Color. 24 minutes. Sales executive, a Jet Star Airplane, and a very important customer.

"Wings at Work" Color. 28 minutes. History of commercial aviation.

4. Shell Oil Company
Film Library
149-07 Northern Boulevard
Flushing, New York
"Song of the Clouds" 16 mm Sound Color. 36 minutes. Story of international air transportation.

III. Aviation and the Individual

A. Vocational and Career Opportunities in Aviation

B. Utility of Airplanes in Businesses and Professions

Sources:

1. Air Transport Association
1000 Connecticut Avenue, N.W.
Washington, D.C. 20036
Career Opportunities with the Airlines. Free

2. Cessna Aircraft Company
P. O. Box 1521
Wichita, Kansas 67201
"What Are You Going To Do with the Next Half Century?" $ .25

3. Superintendent of Documents
Government Printing Office
Washington, D.C. 20402
"Employment Outlook in Civil Aviation"
Occupational Outlook Handbook, No. 1450-96 $ .15
"Aircraft, Missiles, and Spacecraft"
Occupational Outlook Handbook, No. 1450-93 $ .10

Occupational Outlook Quarterly, Dec. 1963 $ .35

Monthly Labor Review, Nov. 1963 $ .75

4. National Business Aircraft Association
Suite 401, Pennsylvania Building
425 13th Street, N.W.
Washington, D.C. 20004
Information on the business fleet.

Periodicals:

Same as those listed under Aviation Today - Local, National, and Worldwide.

IV. Government in Aviation

A. Federal

1. Legislation

2. Agencies: Federal Aviation Agency
Civil Aeronautics Board

B. State List of State Aeronautics Boards available from:

National Association of State Aviation Officials
Suite 405
1029 Vermont Avenue, N.W.
Washington, D.C. 20005

Sources:

1. Federal Aviation Agency
800 Independence Avenue, S.W.
Washington, D.C. 20553

2. Federal Aviation Agency
Office of General Aviation Affairs, Aviation Education
800 Independence Avenue, S.W.
Washington, D.C. 20553
Aviation Education Materials, 6/1966
Aviation Education Services & Resources - FAA GA-20-2-66-18,000
FAA Films & Filmstrips for Educators GA-20-10-6

3. List of Federal Aviation Agency Regional Offices

Alaskan Region
Public Affairs Officer, AL-5
Federal Aviation Agency
632 Sixth Avenue
Anchorage, Alaska 99501

Central Region
Public Affairs Officer, CE-5
Federal Aviation Agency
4825 Troost Avenue
Kansas City, Missouri 64110

Eastern Region
Public Affairs Officer, EA-5
Federal Aviation Agency
John F. Kennedy Internat'l Airport
Federal Building
Jamaica, New York 11430

Europe, Africa and Middle East
Assistant Administrator
Federal Aviation Agency
Amembassy-FAA
APO New York 09667 or
27 Blvd. du Regent
Brussels, Belgium

Pacific Region
Public Affairs Officer, PC-5
Federal Aviation Agency
P. O. Box 4009
Honolulu, Hawaii 96812

Southern Region
Public Affairs Officer
Federal Aviation Agency
P. O. Box 20636
Atlanta, Georgia 30320

Southwest Region
Public Affairs Officer
Federal Aviation Agency
P. O. Box 1689
Fort Worth, Texas 76101

Western Region
Public Affairs Officer
Federal Aviation Agency
5641 West Manchester Avenue
P. O. Box 90007, Airport Station
Los Angeles, California 90009

List of Federal Aviation Agency Centers

Aeronautical Center
Public Affairs Officer
Federal Aviation Agency
Aeronautical Center
P. O. Box 1082
Oklahoma City, Oklahoma 73101

National Aviation Facilities Experimental Center
Public Affairs Officer
NAFEC
Atlantic City, New Jersey 08405

Washington Air Route Traffic Control Center
Chief
Washington ARTC Center
Route 7 and Route 654
Leesburg, Virginia 22075

4. Civil Aeronautics Board
1825 Connecticut Avenue, N.W.
Washington, D.C. 20025

Consult the Readers' Guide to Periodical Literature in the library for all listed topics.